AMENDMENTS UNDER PCT ARTICLE 34

(ARTICLE 34 AMENDMENTS)

International Application No.: PCT/CA2004/002111

MAIL STOP - PCT

Commissioner for Patents
P.O. Box 1450
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Sir:

REQUEST FOR SUBSTITUTION OF REPLACEMENT SHEETS

Please substitute the attached replacement sheets 54-61, containing the Article 34 Amendments to the claims filed February 22, 2006, for sheets 54-60, of the previously filed Article 34 Amendments to the claims filed June 6, 2005. It is respectfully requested that the claims contained in replacement sheets 54-61, be examined during examination of the patent application. Claims 1-47 are currently pending.

Respectfully submitted,

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By: _____
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AMENDED SHEETS ATTACHED TO AMENDMENT UNDER ARTICLE 34 OF THE PCT, DATED FEBRUARY 22, 2006

We claim:

1. A catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus, the catalytic composite comprising:

a) a support structure, made of a non zeolite inorganic oxide, having a void fraction ranging from 0.30 to 0.95 and a surface area of from 40 m^2/g to 500 m^2/g, the support structure having a shape selected from a ring, a hollow cylinder, a cross or multi partition ring or cylinder with 2, 3, or 4 cell partitions, a saddle, a solid ring, a solid cylinder, a sphere, and a honeycomb body; and

b) from 0.01 to 10% by weight of a catalytically active species comprising a group VIII metal, based on the weight of the catalytic composite, which is deposited on the support structure.

2. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to claim 1, wherein the void fraction is from 0.30 to 0.95 and the surface area is from 50 m^2/g to 500 m^2/g.

3. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to claim 1 or 2, wherein the inorganic oxide is selected from the group consisting of alumina, silica, titania, zirconia and mixtures thereof.

4. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to claim 1 or 2, wherein the inorganic oxide is γ-alumina.

5. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to claim 1 or 2, wherein the inorganic oxide is α-alumina.

6. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to any one of claims 1 to 5, wherein the support structure is in the shape of a Raschig ring.

7. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to any one of claims 1 to 6, wherein the group VIII metal is nickel.

8. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to any one of claims 1 to 7, wherein the group VIII metal is in the form of a metal salt or a metal complex.

9. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to claim 8, wherein the metal salt is in an ionic state.

10. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to claim 8, wherein the metal salt is a metal sulphate, a metal phosphate, a metal oxalate or a metal acetate.

11. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to any one of claims 1 to 6, wherein the catalytically active species is nickel sulphate.

12. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to any one of claims 1 to 6, wherein the catalytically active species is nickel chloride.

13. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to any one of claims 9 to 12, wherein the catalytically active species is in admixture with ammonium sulphate or ammonium phosphate.

14. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to any one of claims 1 to 6, wherein the catalytically active species comprises a group VIII metal and a ligand, wherein the ligand comprises one or more atoms selected from the group consisting of carbon, hydrogen, oxygen, nitrogen and phosphorus.

15. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to claim 14, wherein the group VIII metal is in the zero oxidation state.

16. The catalytic composite for use as a random packing material and catalyst in a catalytic distillation apparatus according to any one of claims 1 to 6, wherein the group VIII metal is palladium, platinum or rhodium.

17. A process for the selective dimerization of a lower alkene to a C_6-C_{12} alkene, which process comprises contacting the lower alkene with a catalytic composite as claimed in any one of claims 1 to 16, under catalytic distillation conditions.

18. The process according to claim 17, wherein the lower alkene is selected from 1-butene, 2-butene and isobutene, and the C_6-C_{12} alkene is selected from trimethylpentene, n-octene, dimethylhexene and methylheptene.

19. The process according to claim 17 or 18, wherein the catalytic composite is admixed with inert distillation packing.

20. The process according to claim 19, wherein the ratio of the catalytic composite to inert distillation packing is from 10:1 to 1:10.

21. The process according to claim 19, wherein the catalytic composite and inert distillation packing are used in separate zones of the catalytic distillation column.

22. The process according to claim 17, wherein the lower alkene is a C_4 alkene and the C_6 to C_{12} alkene is predominantly a C_8 alkene.

23. The process according to claim 22, wherein the C_8 alkene is a trimethylpentene.

24. A process for the hydrogenation of an alkene to an alkane, which process comprises contacting the alkene with a catalytic composite as claimed in any one of claims 14 to 16, and hydrogen, under catalytic distillation conditions.

25. The process according to claim 24 wherein the alkene is selected from trimethylpentene, n-octene, dimethylhexene and methylheptene.

26. The process according to claim 24 or 25, wherein the catalytic composite is admixed with inert distillation packing.

27. The process according to claim 26, wherein the ratio of the catalytic composite to inert distillation packing is from 10:1 to 1:10.

28. The process according to claim 26 wherein the catalytic composite and inert distillation packing are used in separate zones of the catalytic distillation column.

29. The process according to any one of claims 24 to 28, wherein the alkene is trimethylpentene and the alkane is trimethylpentane.

30. A process for preparing high octane compounds, the process comprising:

a) contacting a C_2 to C_6 alkene with a catalytic composite as claimed in any one of claims 1 to 16, under catalytic distillation conditions, to obtain a C_6 to C_{18} alkene; and

b) contacting the C_6 to C_{18} alkene from step a) with a catalytic composite as claimed in any one of claims 14 to 16, and hydrogen, under catalytic distillation conditions, to obtain a C_6 to C_{18} alkane.

31. The process according to claim 30, wherein the process steps a) and b) are carried out in a single catalytic distillation column.

32. The process according to claim 30, wherein the process steps a) and b) are carried out in separate catalytic distillation columns.

33. The process according to claim 30 or 31, wherein the C_2 to C_6 alkene is a C_4 alkene and the C_6 to C_{18} alkene is a C_8 alkene.

34. The process according to claim 33, wherein the C_8 alkene is trimethylpentene.

35. A process for preparing high octane compounds, the process comprising:

a) contacting isobutene with a catalytic composite as claimed in any one of claims 1 to 16, under catalytic distillation conditions, to obtain trimethylpentene; and

b) contacting trimethylpentene with a hydrogenation catalyst, and hydrogen, under batch reaction conditions or under hydrogenation reaction conditions to obtain trimethylpentane.

36. A process for the production of C_6-C_{18} alkenes, which process comprises contacting a mixture of C_2-C_6 alkenes with a catalytic composite as claimed in any one of claims 1 to 16, under catalytic distillation conditions.

37. A process according to claim 36, wherein each C_2-C_6 alkene in the mixture is oligomerized within different reactive zones found in a single catalytic distillation column.

38. A process according to claim 36, wherein each C_2-C_6 alkene is oligomerized within different reactive zones found in two or more linked catalytic distillation column.

39. A process according to any one of claims 36 to 38, wherein the mixture of C_2-C_6 alkenes comprises one or more C_4 alkenes.

40. A process for the selective oligomerization of a lower alkene to a C_6-C_{18} alkene, which process comprises contacting a mixture of C_2 to C_6 alkenes and C_1 to C_6

alkanes with a catalytic composite as claimed in any one of claims 1 to 16, under catalytic distillation conditions.

41. A catalytic composite for use as a random packing hydrogenation catalyst in a catalytic distillation apparatus, the catalytic composite comprising:

a) a support structure, made of an inorganic oxide and having a void fraction ranging from 0.30 to 0.95, the support structure having a shape selected from a ring, a hollow cylinder, a cross or multi partition ring or cylinder with 2, 3, or 4 cell partitions, a saddle, a solid ring, a solid cylinder, a sphere, and a honeycomb body; and

b) from 0.01 to 10% by weight of palladium, platinum or rhodium, based on the weight of the catalytic composite, which is deposited on the support structure.

42. The catalytic composite for use as a random packing hydrogenation catalyst in a catalytic distillation apparatus according to claim 41, wherein the inorganic oxide is α-alumina.

43. The catalytic composite for use as a random packing hydrogenation catalyst in a catalytic distillation apparatus according to claim 42, wherein the α-alumina has a surface area of from 0.1 to 1.0 m^2/g.

44. A process for the hydrogenation of butadiene, the process comprising contacting butadiene with a catalytic composite as claimed in any one of claims 41 to 43, and hydrogen, under catalytic distillation conditions.

45. A process for the selective hydrogenation of methylacetylene and propadiene in a C3 fraction to provide propylene, the process comprising contacting the C3

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fraction with a catalytic composite as claimed in any one of claims 41 to 43, and hydrogen, under catalytic distillation conditions.

46. A process for the selective hydrogenation of allene and propyne in a fluid catalytic cracking (FCC) stream, the process comprising contacting the FCC stream with a catalytic composite as claimed in any one of claims 41 to 43, and hydrogen, under catalytic distillation conditions.

47. A process for the selective hydrogenation of butadiene in a raffinate I or a raffinate II stream to provide a butene, the process comprising contacting the raffinate I or the raffinate II stream with a catalytic composite as claimed in any one of claims 41 to 43, and hydrogen, under catalytic distillation conditions.